DPP
DAILY PRACTICE PROBLEMS

**CLASS : XIth** **SUBJECT : PHYSICS**
**Date :** **DPP No. : 1**

# Topic :- KINETIC THEORY

1. The speeds of 5 molecules of a gas (in arbitrary units) are as follows: 2,3,4,5,6. The root mean square speed for these molecules is
   a) 2.91 b) 3.52 c) 4.00 d) 4.24

2. The rate of cooling at 600 K, if surrounding temperature is 300 K is $R$. The rate of cooling at 900 K is
   a) $\frac{16}{3}R$ b) $2\,R$ c) $3\,R$ d) $\frac{2}{3}R$

3. For a diatomic gas change in internal energy for unit change in temperature for constant volume is $U_1$ and $U_2$ respectively. $U_1$:$U_2$ is
   a) 5 :3 b) 3 :5 c) 1 :1 d) 5 :7

4. The temperature of a piece of metal is increased from 27°C to 84°C. The rate at which energy is radiated is increased to
   a) Four times b) Two times c) Six times d) Eight times

5. The kinetic energy of translation of 20 $g$ of oxygen at 47°C is (molecular wt. of oxygen is 32 $g/mol$ and R = $8.3J/mol/K$)
   a) 2490 $joules$ b) 2490 $ergs$ c) 830 $joules$ d) 124.5 $joules$

6. Two thermally insulated vessels 1 and 2 are filled with air at temperatures ($T_1$,$T_2$) volume ( $V_1$,$V_2$) and pressure ($P_1$,$P_2$) respectively. If the valve joining the two vessels is opened, the temperature inside the vessel at equilibrium will be
   a) $T_1 + T_2$ b) $(T_1 + T_2)/2$ c) $\frac{T_1T_2(P_1V_1 + P_2V_2)}{P_1V_1T_2 + P_2V_2T_1}$ d) $\frac{T_1T_2(P_1V_1 + P_2V_2)}{P_1V_1T_1 + P_2V_2T_2}$

7. The pressure and volume of saturated water vapour are $P$ and $V$ respectively. It is compressed isothermally thereby volume becomes $V/2$, the final pressure will be
   a) More than $2P$ b) $P$ c) $2P$ d) $4P$

8. At which temperature the velocity of $O_2$ molecules will be equal to the velocity of $N_2$ molecules at 0°C
   a) 40°C b) 93°C c) 39°C d) Cannot be calculated

9. Kinetic theory of gases provide a base for
   a) Charle's law
   b) Boyle's law
   c) Charle's law and Boyle's law
   d) None of these

10. The time average of the kinetic energy of one molecule of a gas taken over a long period of time
   a) Is proportional to the square root of the absolute temperature of the gas
   b) Is proportional to the absolute temperature of the gas
   c) Is proportional to the square of the absolute temperature of the gas
   d) Does not depend upon the absolute temperature of the gas

11. Kinetic theory of gases was put forward by
   a) Einstein
   b) Newton
   c) Maxwell
   d) Raman

12. In kinetic theory of gases, which of the following statements regarding elastic collisions of the molecules is wrong
   a) Kinetic energy is lost in collisions
   b) Kinetic energy remains constant in collision
   c) Momentum is conserved in collision
   d) Pressure of the gas remains constant in collisions

13. If $\gamma$ is the ratio of specific heats and $R$ is the universal gas constant, then the molar specific heat at constant volume $C_v$ is given by
   a) $\gamma R$
   b) $\frac{(\gamma - 1)R}{\gamma}$
   c) $\frac{R}{\gamma - 1}$
   d) $\frac{\gamma R}{\gamma - 1}$

14. The vapour of a substance behaves as a gas
   a) Below critical temperature
   b) Above critical temperature
   c) At 100°C
   d) At 1000°C

15. If the temperature of an ideal gas increases three times, then its *rms* velocity will become
   a) $\sqrt{3}$ times
   b) 3 times
   c) One third
   d) Remains same

16. The relationship between pressure and the density of a gas expressed by Boyle's law, $P = KD$ holds true
   a) For any gas under any conditions
   b) For some gases under any conditions
   c) Only if the temperature is kept constant
   d) Only if the density is constant

17. If the ratio of vapour density for hydrogen and oxygen is $\frac{1}{16}$, then under constant pressure the ratio of their *rms* velocities will be
   a) $\frac{4}{1}$
   b) $\frac{1}{4}$
   c) $\frac{1}{16}$
   d) $\frac{16}{1}$

18. The gases carbon-monoxide (CO) and nitrogen at the same temperature have kinetic energies $E_1$ and $E_2$ respectively. Then
   a) $E_1 = E_2$
   b) $E_1 > E_2$
   c) $E_1 < E_2$
   d) $E_1$ and $E_2$ cannot be compared

19. What is the mass of 2 L of nitrogen at 22.4 atm pressure and 273 K?

a) 28 g b) $14 \times 22.4$ g c) 56 g d) None of these

20. The average kinetic energy of a gas molecules is

a) Proportional to pressure of gas
b) Inversely proportional to volume of gas
c) Inversely proportional to absolute temperature of gas
d) Directly proportional to absolute temperature of gas